

## RECORDS OF SOUTH AFRICAN LACERTILIA AND AMPHIBIA.

### ADDENDA AND CORRIGENDA.

By JOHN HEWITT, B.A., Cantab., Director of Albany Museum.

THIS paper includes some new records of lizards and frogs and a few corrections on my previous records (Vol. II, pp. 29 and 77, of these Annals, and Records Albany Museum, Vol. II, p. 190). There has recently been published important papers dealing with the South African Fauna by Dr. Werner on the collections of Schultze's expedition in German South-West Africa (Schultze, *Forschungreise in Südafrika*, IV), and by Mr. Boulenger on the collections of the South African Museum (Annals South African Museum, Vol. V, pt. 9). Some of the records given in the latter paper appear to be incorrect, and therefore I venture to make certain alternative suggestions which may prevent the perpetuation of possible error and at any rate should direct the attention of other workers to some of the problems of distribution peculiar to this sub-continent. Of course, it is not to be expected that the more delicate problems of distribution in South Africa will be solved for us through lists compiled by the authorities in Europe; but it is of importance to us that the publications of an eminent herpetologist should not be marred by the inclusion of doubtful locality data.

A rather less serious source of confusion arises from the fact that every authority has his own value for the terms "species" and "variety", with the result that we are presented with many conflicting opinions; but not until the work is undertaken by men who have an intimate knowledge of the local conditions and who, with representative collections at their disposal, will concentrate their attention on the South African fauna as such, can we hope to have a correct valuation of the various species and their varieties.

One of the outstanding facts of vertebrate distribution in this region is that in passing from east to west there is a very considerable change of fauna, the species of Natal and eastern Cape Province being represented in western Cape Province by different species of the same genera; in other cases western genera do not occur at all in eastern Cape Province, and vice versa. The questions arise, what are the boundary lines? are they conterminous with physical or geographical barriers? and are there any intermediates or do the specific areas overlap? I may add that for such problems the lizards and tortoises (see Dr. Duerden in Report S. A. A. S., 1906, p. 178)\* are quite the most suitable of all vertebrates, as their scale characters are so easily defined; frogs offer special difficulties, as they possess no clearly marked specific characters. It is absolutely essential that critical determinations should be based only

\* This suggestive paper can be commended to all students of geographical distribution.

on adult specimens, and it is desirable that each locality should be represented by more than one specimen.

Of late years the various authors have created many new species on insufficient grounds: a goodly proportion of these have already found their way into the synonymy, and I have a few more reductions to make here.

## LACERTILIA.

*Ptenopus garrulus* Smith.—Rietfontein, Gordonia (H. Drew).

*Palmatogecko rangei* Anders.—Dr. Werner gives some excellent figures of this gecko: misprinted *Pematogecko* in *Annals South African Museum*.

*Oedura africana* Boul. (synonym, *O. nivaria* Boul.).—The position of the nostril relative to the rostral scute is the only character which separates the two forms. It is certainly an easily ascertained character, but probably not of specific value. According to the descriptions, *africana* has the nostril between the rostral and three nasals, the upper of which is large and forms a suture with its fellow; *nivaria* has the nostril between four or five scales, the upper largest and separated from its fellow by a granule, and the Pirie specimen (F. A. O. Pym) combines these characters, for the nostril lies between the rostral, the first labial and three nasals, the anterior nasal, which is largest, being separated from its fellow by a granule.

Judging from the published records, the two forms certainly have an overlapping distribution in eastern Cape Province and Natal, and it is significant that Durban is credited with both species (Roux and Boulenger). The original record of *africana* from Damaraland must, I think, be viewed with suspicion, for it has never been taken in that region by the German explorers and, moreover, the type specimen was taken from a snake, *Pythonodipsas carinata* Günth., which also is not otherwise known from the western portion of South Africa.

*Lygodactylus capensis* Smith.—Potchefstroom (W. Moore), Pongola (Trans. Mus.), Mafeking (Kimberley Mus.). Werner records it from Keetmanshoop in German South-West Africa.

*Lygodactylus ocellatus* Roux.—Athol, Ermelo District (Miss M. Forbes).

*Pachydactylus bibroni* Smith.—According to Dr. Werner the following are local races of this species: *P. laevigatus* Fisch., with smooth dorsal tubercles; *P. bibroni* sens. strict., with strongly keeled or trihedral dorsal tubercles; *P. stellatus* Wern., with radially keeled dorsal tubercles; *P. boulengeri* Torn. of East Africa. But it seems to me doubtful if all these are entitled to rank even as geographical varieties, seeing that there is considerable variation as regards the dorsal tubercles in specimens from limited areas. I have seen typical specimens of *stellatus* from Rietfontein, Gordonia (H. Drew).

Our examples of *bibroni* show some variation in the arrangement of the scales bordering the nostril, and the anterior nasals may be broadly in contact or completely separated. The general distribution cited by Mr. Boulenger for this species requires a little qualification in view of the fact that the species is unknown from Natal and Zululand, though it occurs in the Barberton District.

*Pachydactylus capensis* Smith.—Dr. Werner regards the following as local forms of this species: *P. capensis* sens. strict., with weakly keeled dorsal tubercles; *P. formosus*, with strongly keeled dorsal tubercles and four to five subdigital lamellae; *P. fasciatus*, with strongly keeled dorsal tubercles and six to nine subdigital lamellae. He allows *mentomarginatus* Smith and *weberi* Roux to rank as distinct species. Now *mentomarginatus* was reduced both by Mr. Boulenger and myself as a synonym of *formosus*; and the author of *weberi* himself stated that this species comes between *capensis* and *formosus*. In my paper I pointed out the resemblance between *weberi* and *fasciatus*. As regards *affinis* Boul., it was stated by Roux (Zool. Jahrb. 25, p. 410) that the author of that species had agreed with him to sink *affinis* as a synonym of *formosus*. It is now my opinion that all these so-called species are nothing more than forms of *capensis*, for the characters by which they are distinguished—degree of keeling of dorsal scales, arrangement of nasal scutes—are so variable that it is undesirable to give them either individually or collectively specific value; it is certain, however, that several of these forms may justly rank as geographical varieties separated by colour pattern and by loosely defined structural differences. The var. *formosus* has a distinctive pattern and may also be separated from the var. *capensis* by the dorsal scaling and according to Dr. Werner by the shape of the symphyisial scute, which is longer than that of *capensis*; the var. *affinis* appears to be distinguished from *capensis* proper through the head scaling only; the var. *fasciatus* has a characteristic pattern and has rather more subdigital lamellae than the typical *capensis*: *weberi* is only distinct in the arrangement of its nasal scutes, but as it was described from four specimens we may presume that the same arrangement was common to all, though Dr. Roux does not expressly state thus.

The confusion that exists on these matters can be guessed at by comparing together the various locality records. *Capensis* and *affinis* are both recorded (Boulenger) from the same collector in Southern Rhodesia, all previous records having been given as *affinis* only; both *capensis* and *formosus* are assigned to Port Elizabeth, the latter being quite new for the coastal districts of eastern Cape Colony; Schultze's number 742 from Steinkopf is referred by Dr. Werner partly to *capensis* and partly to *formosus*—Dr. Roux recorded *capensis* from that locality. If we must accept all these records, it follows that the various forms *capensis*, *formosus*, and *affinis*—call them as we will species or varieties—have no geographical significance.

The most obvious difference between *capensis* and *formosus* is in the dorsal pattern, and it is interesting to note that parallel differences in other groups of animals obtain between the western Cape and Transvaal representatives of the same species. For instance, the Cape Peninsula form of *Bufo regularis* is a much handsomer creature than that of the high plateau, and the Cape form of *Amplorhinus multimaculatus* is appropriately named, whilst the high veld form of this species is uniformly dull green; *Dispholidus typus* is more handsomely marked in Cape Province than in the Transvaal, and similar striking differences are seen in *Sepedon haemachates* and in *Agama atra*.



The general distribution cited for *formosus* by Mr. Boulenger is Cape Colony, Bechuanaland, and Transvaal. I believe, however, that *formosus* in the strict sense does not occur in the Transvaal, nor have I seen any Bechuanaland records for this form; it belongs essentially to western Cape Province.

Other records for *capensis sens. strict.* are Potchefstroom (W. Moore); Athol, Ermelo District (Miss M. Forbes); and Dr. Werner gives Severelela in the Kalahari. The Athol specimen has eight thin white crossbands on the back, and reticulately arranged white lines on the hind part of the head; the nasorostrals are separated, but the specimen is not quite adult.

*Pachydactylus rugosus* Sm th.—Rietfontein, Gordonia (H. Drew). Dr. Werner records it from Kubub and Kamaggas in German South-West Africa.

*Pachydactylus maculatus* Smith.—Mr. Boulenger's general distribution for this species is Cape Colony, Natal, Transvaal, and Southern Rhodesia. I know of no records from the Transvaal, but possibly it occurs in the low veld districts, as it is known from Zululand. The Bulawayo record is the first from Rhodesia, and the species was not included in Mr. Chubb's lists of the reptiles in the Bulawayo Museum.

*Pachydactylus ocellatus* Cuv.—Mr. Boulenger cites Cape Colony, Natal, Transvaal and Angola, but I have never seen any record from Natal and the Transvaal. It is essentially a western species. Werner cites Kubub, Luderitzbucht, and S. Hereroland.

*Pachydactylus mariquensis* Smith.—In view of the importance attached by Mr. Boulenger to the character which serves to distinguish his two divisions of the *ocellatus* section, I have re-examined the Bluecliff specimen of *mariquensis* (Port Elizabeth Museum). The specimen is undoubtedly referable to this species, having only three subdigital lamellae and perfectly typical head markings. The head is a little flattened and the snout is a trifle longer than the eye; the nasorostrals are in contact; the granules on the snout are about twice the size of those on the hinder part of the head; the rostral is broader than deep and it does not enter the nostril. Having regard to this variation in the head character, I am very doubtful about the validity of *P. serval* Wern. and *P. purcelli* Boul. which I suspect to be forms of *ocellatus*.

*Pachydactylus serval* Wern.—This form, according to the author of the species, is near to *ocellatus*, but differs as follows:—

Snout somewhat longer than the eye, nasorostrals usually separated,  
subdigital lamellae 4-5.....*ocellatus*.

Snout  $1\frac{3}{4}$  times as long as the eye, nasorostrals in contact, subdigital  
lamellae 6.....*serval*.

The dorsal pattern is dark brownish-grey with unarranged dark spots. There is evidently very little fundamentally different between these two forms; at any rate they are not so widely separated in their head characters as represented in Mr. Boulenger's key, and the nasorostral character is quite unreliable, as I have found much variation in this respect both in *bibroni* and in *capensis*.

*P. purcelli* Boul.—The only character worthy of consideration is that furnished by the rostral scute, which is nearly twice as broad as deep and

it borders the nostril; but it may be doubted if this is of specific importance (cp. *Oedura*). As regards the snout character it is intermediate between typical *ocellatus* and *serval*. The nasorostral character is not given. The colour markings are of the same general type as *serval*.

*P. amoenus* Wern.—This is placed by Dr. Werner near *mariquensis*. The characters are: snout  $1\frac{1}{2}$  times as long as the eye, nasorostrals separated, subdigital lamellae 5–6; five dark crossbands on the back, a dark spot on the side of the snout over both lips and another one on the lower lip just beneath the eye. The colour pattern is distinct enough, but in its structural characters it is difficult to see anything specifically distinct from *ocellatus*; the pattern of purcelli, “pale-brownish above with darker marblings or vermicular spots which may form more or less regular crossbands”, connects together typical *ocellatus* and *amoenus*. Dr. Werner describes the rostral shield as twice as broad as long in *amoenus*, and Mr. Boulenger says of *ocellatus*, “rostral not or but slightly broader than deep; this is a character which presumably varies with the shape of the head”.

*Hemidactylus mabowia* Mor. de Jon.—Bushman Mine, S. Rhodesia (Bro. J. H. Power).

*Agama*.—This genus is evidently in a very confused state. Dr. Werner regards both *distanti* Boul. and *brachyura* Boul. as local races of *hispidia* Lin.; Dr. Gough considered that *distanti* is only a variety of *hispidia* (see these Annals, Vol. I, p. 183); Mr. Boulenger maintains both as distinct species. Our material seems to show that *brachyura* Boul. is distinct from *hispidia* proper, but approaches *distanti*, this latter form being, however, a geographical variety of *hispidia*. Whatever view be taken it is desirable to make use of the names for distribution studies. In my opinion the following records require further investigation: *hispidia*, *distanti*, and *aculeata* from Kroonstad (Boulenger); I think it likely that the two former records refer to only one species. The same authority records *hispidia* from Durban and *distanti* from Kowie; if these species are really distinct it is remarkable that the species characteristic of the Cape Peninsula (i.e. *hispidia*) should occur at Durban, whilst the high plateau form inhabits Kowie. Werner records *hispidia* from Steinkopf, Mafeking, and the Kalahari, but qualifies this by saying that the Steinkopf example approaches *brachyura* and the Kalahari form *distanti*. Roux recorded *brachyura* from Steinkopf, and presumably he was dealing with the same species as Werner. As Dr. Roux has remarked, the records go to show that *hispidia sens. strict.* belongs to the southern part of Cape Province (western half), whilst the form *distanti* belongs particularly to the Transvaal (and Free State), and *brachyura* belongs to northern Cape Province and Namaqualand. It is regrettable that Mr. Boulenger has completely united *aculeata* and *armata*. No doubt they are merely the extreme forms of the same species, but they appear to have a geographical significance, and the two forms have the same relationship to each other as *hispidia* and *distanti*. Dr. Werner had already shown that the specific distinction between the two forms could not be maintained, but all his records from S. Hereroland, Kalahari, and German South-West Africa are referred to *aculeata* proper, although one of his Hereroland examples



is said to be intermediate between the two species. The form *armata* on the other hand appears to be the eastern form occurring, for example, in Zululand.

Dr. Werner reduced *pulchella* Boc. as a synonym of *aculeata*, and *planiceps* from Windhoek he regards as specifically the same as *colonorum*, the former being the rock frequenting variety and the latter arboreal.

*Agama brachyura* Boul.—Additional records are Kimberley (Bro. J. H. Power), Victoria West (P. D. Morris), Cradock (Sister Joseph), Fish River Rand, Bedford District (Albany Museum, old collection), Tafelberg, Middelburg District, Cape Province (Ernest Gadd), Belmont (Kimberley Museum).

Dr. Werner says that the heterogeneous dorsal scaling is continued over the basal third of the tail in *hispida*, but not in *brachyura*.

*Agama aculeata* Merr.—Grahamstown (Albany Museum).

*Zonurus giganteus* Smith.—Zand River, Wakkerstroom District (Transvaal Museum), Basutoland (Albany Museum).

*Zonurus polyzonus* Smith.—My Irene record is incorrect; it should be Hanover, Cape Province (*vide* L. Taylor). It is not known from the Transvaal. Belmont (Kimberley Museum), Aliwal North (Albany Museum).

*Zonurus cordylus* Lin. and *Z. vittifer* Reich.—It is unfortunate that the records for these two forms have been lumped together in one by Mr. Boulenger. Dr. Jean Roux had previously united them specifically, but had assigned to *vittifer* the rank of a distinct variety. Whether we label it species or variety the form is easily distinguished from *cordylus*, and it is certain that the two forms have a geographical meaning.

My record Teafontein for *vittifer* was probably incorrect. I know of no certain record from Cape Province.

The distribution of *cordylus* is improperly known. Bocage recorded it from South Angola; Boulenger says the whole of South Africa, and cites Walfisch Bay, but Werner does not know it from German South-West Africa. The Walfisch Bay record comes from the same collector as the *Oedura africana* (*q.v.*). It may therefore eventually prove that *cordylus sens. strict.* is confined to Cape Province.

*Zonurus jonesii* Boul.—The specimens from Steynsburg and Uitenhage referred to by myself (Vol. II, p. 36) are probably immature individuals of *cordylus*. Kimberley is the most southern record known to me for *jonesii*. Pongola River (Transvaal Museum), M'moove (42 miles north of Serowe) (Dr. S. Schönland).

*Zonurus tropidogaster* Boul.—The description does not show what relationship this form has to *vittifer* and *cordylus* as distinct forms. As I have shown, the frontonasal scute of *vittifer* varies very considerably in degree of development, and Reichenow's original description stated "frontonasal very small". I cannot think that the absence of this scute is in itself of specific importance. The example is almost certainly juvenile. I think it highly probable that this is the same as *vittifer*.

*Chamaesaura aenea* Fitz.—Oakville Farm, Elliot District (C. S. McGregor). The only Cape record known to me.

*Chamaesaura anguina* Lin.—My Irene locality is incorrect; it should be Tokai, C.P. Grahamstown, Bathurst, and Swellendam (Albany Museum).

*Chamaesauru macrolepis* Cope.—Lower Tugela (A. Bentley), Durban Museum.

*Platysaurus*.—Mr. Boulenger unites *capensis* and *guttatus*. All the specimens I have seen agree with *guttatus*, and are different in general appearance from the form figured by Smith as *capensis*. Apparently *capensis* has never been taken again from the locality (Great Namaqualand) given by Smith. My species *wilhelmi* is a distinct form, the adult male differing from *guttatus* in its broader head and heterogeneous dorsal lepidosis.

*Nucras*.—Dr. Werner has many records of *tessellata* from German South-West Africa, but apparently he has not seen *delalandi* from that part, though he adds that the species is recorded (Brit. Mus. Cat.) from Damaraland; this record needs confirmation. The specimen from Shilowane recorded by me as doubtfully *delalandi* should be referred to *tessellata*. The Kimberley Museum has the same form of *tessellata* from Marandellas (Rhodesia). The largest Marandellas specimen is of large size, rather like *delalandi*, but the adpressed limbs are overlapping; there are 41 scales across the body dorsally and there are 31 transverse rows of ventrals; three granules between the supraoculars and supraciliaries; dorsally it is almost uniformly light brown with the merest indication of dorsolateral and middorsal pale streaks, the sides are blackish with some pale scales, and anteriorly is an indication of pale vertical streaks. Along with this came two other specimens, typically *tessellata* in markings, but considerably smaller than the above. I judge from this that *tessellata* tends to lose its stripes with age.

*Tropidosaura montana* D.B.—Grahamstown (Miss G. E. Baines).

*Ichnotropis capensis* Smith.—Marandellas (Rhodesia), Kimberley Museum. Mr. Boulenger cites German South-West Africa, but Dr. Werner says it is not known from that region.

*Ichnotropis squamulosa* Pet.—Pongola River (Transvaal Museum).

*Eremias lugubris* Smith.—Francistown (Bro. J. H. Power). Dr. Werner cites "Aar, Südafrika", which appears to be a Cape record, the only one known to me.

*Eremias inornata* Roux.—According to Mr. Boulenger a synonym of *undata* Smith, but I do not so regard it. From the excellent figure and description given by Dr. Roux, it appears to be nearer *namaquensis* and if there be sufficient reason for uniting *inornata* with *undata* it will be necessary to include also *namaquensis*. Dr. Werner remarks that *namaquensis* and *undata* are very closely allied. However, the scaling of the lower eyelid will distinguish the three forms and as I have found this character very constant in other species (cp. *lineocellata*), it seems advisable to recognize the three forms as distinct species. This character is probably less variable than the number of rows of ventral scales, and is therefore more reliable for separating allied species, though Mr. Boulenger prefers the latter character in his key.

*Eremias lineocellata* D.B. and *pulchella* Gr y.—No doubt these are extremes of the same species and they are united by Mr. Boulenger. I think it is desirable to retain the names for as geographical varieties they are fairly distinct. They were maintained both by Roux and Werner



whose records, moreover, agree together. It appears that *pulchella* belongs to German South-West Africa and western Cape Province, whereas *lineocellata* is the Transvaal, Free State, and Kalahari form. According to Werner, *pulchella* is a very variable species with many local races.

*Eremias namaquensis* D.B.—Victoria West (P. D. Morris), Middelburg, C.P. (P. O'Connor).

*Eremias undata* Smith.—The Middelburg record (Boulenger) requires investigation in view of the supposed relationship between this species and *namaquensis* which latter species certainly occurs in that locality.

*Scapteira knoxi* M. Edw.—A very common species in German South-West Africa (Werner) and also known from the western districts of Cape Province. The Durban record (Boulenger) requires confirmation, this being the first record from the eastern portion of this subcontinent; indeed the whole genus appears to be confined to the western parts. The Comoro Island record of the Brit. Mus. Cat. is not now cited by Mr. Boulenger and is no doubt incorrect.

*Scapteira depressa* Merr.—In drawing attention to the identity of *Eremias suborbitalis* Pet. with this species Mr. Boulenger suggests a convenient character in the subocular scute for distinguishing between the allied genera *Scapteira* and *Eremias*. At the same time it would appear from the description of *S. reticulata* Boc. that this species has in that respect the same feature as the genus *Eremias*; and Bocage himself recognized that in the conformation of its anterior digits his *reticulata* departs from the typical *Scapteira* so that *reticulata* combines the characters of both genera, and as *S. depressa* has been referred by the various authors to both genera it is evident that the differences between *Scapteira* and *Eremias* are not sharply defined.

*Scapteira reticulata* Boc.—According to Dr. Werner, *S. serripes* Pet. is a synonym of the Angola species *reticulata*.

*Scapteira cuneirostris* Strauch.—Only known from German South-West Africa (Werner), and recorded from Walfisch Bay and Prince of Wales Bay.

*Gerhrosaurus major* A. Dum.—The distribution of this species is not so disconnected as was hitherto supposed (typical form in German East Africa, and *grandis* in Zululand), for it is recorded (Manchester Memoirs, Vol. 51) from the Feira district near the Zambezi (Boulenger).

*Gerrhosaurus nigrolineatus* Hallow.—This was reduced by Tornier as a variety of *flavigularis*, and his opinion was endorsed by Roux, Werner, and myself, but Mr. Boulenger still retains the species. I have re-examined our collections on this point and find that as regards the praefrontal character—which is, in my opinion the only character worthy of consideration—all our Cape specimens agree with *flavigularis* in the strict sense, but a single specimen from Serowe (S. Blackbeard) agrees with *nigrolineatus*; however another specimen from the same locality and donor agrees entirely with *flavigularis* and as the two specimens are otherwise precisely identical, there can be no doubt but that they belong to a single species, *flavigularis*. *G. nigrolineatus* may be a distinct form in tropical Africa, but in South Africa the individuals that have been thus named are almost certainly specifically identical with *flavigularis*. Werner records



the variety *nigrolineatus* from Nitdraai, east of Windhuk, but this appears to be his only record for *flavigularis* from German South-West Africa.

*Gerrhosaurus auritus* Boett.—I have already given reasons for suspecting the validity of this species, and it now appears that it is only known to Dr. Werner through the original description.

*Mabuia*.—The records for this genus require thorough revision. Dr. Werner has evidently confused together the two species *trivittata* and *varia*, though they are not closely allied; his figure of *varia* (Pl. 8, fig. 12) really represents a half grown specimen of *trivittata*. In his description of *calaharica*, reduced by Mr. Boulenger as a form of *trivittata*, Dr. Werner says "subocular scute not reduced and subdigital lamellae smooth", and yet he placed it as a near ally of *varia*.

*M. peringueyi* Boul.—In view of the variation exhibited by this form and by *homalocephala* as mentioned in my previous paper, it will be necessary to regard *peringueyi* as a local form of *homalocephala*.

*M. occidentalis* Pet.—According to Dr. Werner this species is distinguished from *trivittata* by the following characters, in addition to that of the ear lobules: *occidentalis* has 23 subdigital lamellae and the anterior angle of the frontonasal is a right angle: *trivittata* has 19 subdigital lamellae and the anterior angle of the frontonasal is obtuse.

*M. trivittata* Cuv.—Mafeking (Kimberley Museum).

*M. varia* Pet.—This species closely resembles *striata* as stated in my previous paper, and it may also be very similar in dorsal pattern to *sulcata*; in our Middelburg (Cape) specimens of *varia* there is the same longitudinal striping as in *sulcata*, and the white lateral streak of a typical *varia* is not well marked. It can be distinguished from *sulcata* by the subocular character and by its longer ear lobules.

Middelburg, C.P. (P. O'Connor), Victoria West (P. D. Morris).

*M. sulcata* Pet.—The characters cited in Mr. Boulenger's key are insufficient for separating *sulcata* and *striata*. The presence of tricarinate dorsal scales in *sulcata* has been noted both by Dr. Werner and myself. The Durban record (Boulenger) requires confirmation.

*M. hildebrandti* Pet.—This was first recorded from South Africa by Dr. Werner and more recently by Mr. Boulenger. The identification appears to be somewhat doubtful. Dr. Werner's figure does not agree with the description of the species as given in the Brit. Mus. Cat.; however, he mentions that the identification is uncertain, as in his specimens the first upper labial is not in contact with the loreal—whereas they are broadly in contact in the type specimens—and, moreover, the hind-limb is shorter and the colour different. Whatever may be the identity of Werner's species, it cannot be quite the same as the form called *hildebrandti* by Boulenger, for the latter author in his key distinguishes between *varia* and *hildebrandti* simply by the length of the hind-limb in relation to the body, and Werner's figure agrees precisely with *varia* in this respect; this figure unfortunately does not clearly show the subocular character, so that it is impossible to judge further of its affinity to *varia*. The disconnected distribution of *hildebrandti* as cited by Mr. Boulenger is somewhat remarkable, "Somaliland, German South-West Africa, Little Namaqualand", but is not specially anomalous if *hildebrandti* is merely a longlegged

form of *varia*. The original description of Peters is insufficient for critical distinctions but he stated that in habit and form of the upper head shields the species closely resembles *quinquetaeniata*, and from his figure it appears that the subocular character is very like that of *varia*. According to the descriptions the following are the distinguishing characters of this species: snout much depressed with deeply concave loreal margin, hind-limbs longer than in *varia*, being 34 or 36 mm. (170 mm. total length), whereas in *varia* the hind limbs are 27 mm. (total length of 165 mm.). The mutual relationships of the three forms, *hildebrandti* from Somaliland, *hildebrandti* from German South West Africa, and typical *varia* require investigation.

*Scelotes bipes* L.—Port Nolloth (Werner). Mr. Boulenger cites German South West Africa, but Dr. Werner does not know it from that region.

*Scelotes guentheri* Boul. and *gronovii* Daud.—The former name, according to previous identification by the author of the species, applies to the Natal and Zululand form, and the type was described and figured as having a postnasal scute; besides the specimens previously mentioned by myself, I have seen still another example, from Makowe, Zululand (Durban Museum), which was without the postnasal scute. But this, according to Mr. Boulenger's key, is the only point of distinction from *gronovii*. It seems likely that the three forms, *gronovii* Daud., *inornatus* Smith, and *guentheri* Boul., are only to be distinguished by the character of the hind-limb, which, being at the most a mere rudiment, may be expected to show variation. It is noteworthy that *inornatus* and *guentheri* were both recorded from Port Natal (Brit. Mus. Cat.).

*Acontias*.—It is by no means easy to satisfactorily distinguish between the three species. *A. lineatus* Pet. has been recorded both by Mr. Boulenger and myself from eastern Cape Province (Port Elizabeth, etc.), but I now believe that such examples are more correctly referred to *meleagris*, and that *lineatus* in the strict sense is confined to the Western Province. In any case they differ appreciably from the typical form as figured by Peters and resemble the immature forms of *meleagris* excepting in the supra-ocular character; but I find that this character is not constant in specimens taken together in the same locality, so that it cannot be used for separating species. Mr. Boulenger records both *meleagris* and *plumbeus* from Delagoa Bay, but it may be doubted if such examples from this one locality really represent two distinct species. The species characteristic of Zululand and eastern Transvaal is *plumbeus*, which when adult is easily distinguished from *meleagris*, but half-grown specimens might be referred to either species.

#### BATRACHIA.

Mr. Boulenger's key to the families is incorrect as regards the dentition of the upper jaw (cp. *Cacosternum*).

*Pyxicephalus*.—This old genus, which for good reasons was abolished by Mr. Boulenger in the Brit. Mus. Cat., has been lately restored by Dr. Nieden, and the restoration is accepted by Dr. Werner and by Mr. Boulenger. But, as shown by the latter authority, it agrees very closely with *Rana*, and the only possible justification for a generic separation is the character of the outer metatarsals. But the fact is, the degree of separation of the outer metatarsals varies much in the genus *Rana* (sens. strict.), and careful



examination shows that the following species form a natural series leading from typical *Rana* to typical *Pyxicephalus*: *fuscigula* D.B., *angolensis* Boc., *grayi* Smith, *natalensis* Smith and *delalandi* Tschud. There is indeed a very close general resemblance between *R. grayi* and *R. (P.) natalensis*, and the colour pattern on the side of the head is practically identical in these two species. It is admitted that *delalandi* Tschudi and *delalandi* D.B. are strikingly different, and generic separation would perhaps be permissible were it not for the fact of the existence of such forms as *grayi* and *natalensis*. But even when we consider the extreme forms there is evidently more in common than exists between *Rana* and any other genus of the family; so far as is known the skeletal characters are the same—certainly this is the case with the shoulder girdle—and the common feature of longitudinal glandular lines on the skin is not known in any other genus, at any rate in South Africa. Considering the wide range of variation which is exhibited even in the same species of *Rana* (*vide* Boulenger in Brit. Mus. Cat.) I fail to see the wisdom of separating these two groups of frogs as distinct genera on such slender grounds.

*Rana angolensis* Boc. and *fuscigula* D.B.—Mr. Boulenger's distribution for *fuscigula* is "South Africa, British Central Africa, West Africa"; Dr. Werner says "South Africa und angeblich aus Sierra Leone", which is better in accordance with the known facts of distribution in South Africa, for here the species is confined to the western part of Cape Province and German South-West Africa, in which latter region it is rare apparently. The Angola species is *angolensis*, which spreads over the high plateau and eastern portions of South Africa; if *fuscigula* of western Cape Province reappears in British Central Africa and then again in West Africa north of Angola, its distribution must be very disconnected. The two species are not always easily distinguishable and quite possibly they are extreme forms of the same thing; but however this may be, there is abundant reason for believing that the two forms occupy definite and distinct areas in this sub-continent. It seems as if Mr. Boulenger has confused together the two forms, for he records both species from the same collectors at Port Elizabeth, Calvinia, and Smithfield. As regards the Port Elizabeth species, the material lent me by Mr. Fitzsimons is undoubtedly *angolensis*; the Calvinia record for *angolensis* certainly requires confirmation. The proportions of the hind-limb relative to the body is no doubt, as emphasized in Mr. Boulenger's key, a good distinguishing character, but it may be doubted if this character alone is really reliable; at any rate the shape of the snout should be taken into consideration.

Bro. J. H. Power has taken *angolensis* at Modder River.

*R. queketti* Boul. is now reduced by its author as a synonym of *fuscigula* D.B., but, assuming the correctness of the locality record (Pietermaritzburg), I doubt if it be the same thing as *fuscigula* of western Cape Province; the original description gave the toes as two-thirds webbed but *fuscigula* has entirely webbed feet. If my view be correct, that this is a form of *angolensis*, here is an instance of the uncertainty of the character of relative length of hind-limb and body. Dr. Werner recorded *queketti* from Lobatsi, but added that it differed only from *fuscigula* in the shorter web and unspotted throat; but it is evident that he was dealing with a juvenile specimen 34 mm. long, and no importance can be attached thereto.

*R. mascareniensis* D.B.—The Rev. R. Godfrey has taken this species at Pirie, the most southern record known; Victoria Falls (Honourable P. Methuen).

*R. grayi* Smith.—The Woodbush specimen (Honourable P. Methuen) came from an altitude of about 5500 feet. Probably humidity is an important factor in determining the distribution of this species. Mr. Methuen took the allied species *fasciata* Tschudi in the same neighbourhood at 5800 feet.

*R. (Pyxicephalus) ruddi* Boul.—This will probably prove to be a synonym of *R. ornata* Pet. A careful comparison between the excellent figures published with the original descriptions of these two forms shows a striking resemblance, even to details of colour pattern. Mr. Boulenger stated however that his ruddi is “very closely related to *P. ornata* Pet” . . . but “differs in the shorter web between the toes”; a difference which is hardly appreciated in the figures and represents only a slight range of variation.

*R. (Pyxicephalus) adspersus* Bib.—Dr. Werner’s figure of the tadpole is a very poor one, and quite incorrect so far as the tail is concerned, the swimming web being much better developed than represented in that figure.

*Phrynobatrachus*.—It is hard to believe that the three forms *natalensis* Smith, *ranoides* Boul., and *capensis* Boul. really represent so many distinct species. The two latter are almost certainly very young forms—*natalensis* exceeds 30 mm., whereas the type of *ranoides* was 22 mm. and *capensis* 15 mm. In my Grahamstown series of *natalensis* there is a juvenile specimen of 17 mm. which agrees well with the description of *ranoides*, and I do not doubt but that *ranoides* at any rate is invalid. The distinguishing characters of the key (Boulenger) are not trustworthy, as the tympanum varies according to the method of preservation, and the length of the hind-limb also varies, though not to a great extent in adults. As regards *capensis*, there are two characters cited in the description which do not occur in our series, viz. absence of median papilla on the tongue and absence of the tarsal tubercle.

*Rappia*.—This whole genus requires critical revision. Judging from the very extensive and overlapping distribution accorded to several closely allied forms, it may be doubted if they are all distinct species. For instance, *undulata* Boul. was first described from the Congo, afterwards recorded by the author of the species from Pietermaritzburg and now from Cape Division and from Port Elizabeth; *cinctiventris* Cope has a similar distribution, Senegal, Congo, Angola, Zambezi, Natal, and Cape Colony; the original description of *undulata* stated that it is to be distinguished from *cinctiventris* by the very small head, and now the key (Boulenger) gives “fingers one-third webbed—*undulata*”, “fingers not one-third webbed—*cinctiventris*”. The Cape Peninsula record (Boulenger) for *marmorata* is the first record of this species from the Western Province. *R. argus* Pet. was recorded by Peters from Boror, Upper Zambezi and Zanzibar Coast, and Mr. Boulenger’s general distribution includes Zululand, but I have seen no published records from that district, though quite likely it will prove to occur there.



*R. sugillatus* Cope, which in the British Mus. Cat. is placed as a possible synonym of *microps* Günth., appears to be the same as *nasuta* Günth. judging from Mr. Boulenger's key; Cope's original description is inaccessible to me.

*Cassina senegalensis* D.B.—There are several Cape Division records which, being unique, require confirmation—they come from the same collector (De Souza)—*Cassina senegalensis*, *Megalixalus spinifrons*, and *Rappia marmorata*.

*Phrynomantis annectens* Wern.—The published data regarding this species leaves much to be desired. The type and only known specimen is 16 mm. long, whereas *P. bifasciata* reaches three or four times that length. The author of the species remarks that it closely resembles a *Cacosternum* in that the head and body are considerably depressed. The actual colour characters given are: above light-grey, having in the frontoparietal region a black spot which is prolonged anteriorly towards the eyes on either side and behind is in contact with a dark angular crossband in the shoulder region, the angle directed forwards; a large dark spot on each side of the coccyx, the two spots touching behind; hind legs dark with light crossbands; lower surfaces dirty white, belly with a darker W-shaped design.

*Cacosternum*.—Dr. Werner has also noticed that in this genus the sternum has a bony style, and it appears that the error of the original description in this respect led him to describe namaquense as a distinct species. Apparently it has not been taken in German South-West Africa, but there are several records from Little Namaqualand.

*Hemisis guttatum*.—Umgeni (W. W. Cato), Durban Museum.

*Breviceps*.—Mr. Boulenger has added a good discriminating character in the length of the fourth finger.

*B. pentheri* Wern. has to be abandoned, as Dr. Werner himself reduces it; but I doubt if he is correct in placing it as a synonym or *verrucosus*. As regards *adpersus* Pet., this species was merely indicated rather than described by Peters and I suspect that it is not the same form as is called *adpersus* by Mr. Boulenger. Peters' distribution for the species was Transvaal and Damaraland, and all the Transvaal material I have seen agrees with *mossambicus* rather than *gibbosus*; at the same time there is no reason to suppose that Peters' specimens differed so much from *gibbosus* in respect to the eye character as is represented in Mr. Boulenger's key, as Peters would certainly have noticed so obvious a distinction. One is inclined to suspect that the form so named by Mr. Boulenger is really the same as his *macrops*, especially as he records *adpersus* from Port Nolloth, a locality from which I have received typical specimens of *macrops*. It seems very probable that *pentheri* Wern. and *adpersus* Pet. are the same, and I cannot separate them from *mossambicus* Pet.

As for *verrucosus*, it does not seem advisable to completely unite the species with *gibbosus*, as the typical *gibbosus* of the Cape Peninsula and *verrucosus* of Knysna are so very distinct; no doubt, however, various verrucose forms of *breviceps* have been wrongly recorded under this name. In the records of *gibbosus* and *mossambicus* (Boulenger) there is, I think, evidence of a probable confusion (cp. the Durban and Barberton records).

The Kimberley species which I provisionally referred to *pentheri* is presumably the same as *adpersus* Pet. and the same form occurs at

Mochudi (Kimberley Museum); it reaches a length of 50 mm. and differs only from typical *mossambicus* in that the dorsal surface is distinctly roughened, not smooth.

The unsatisfactory state of the synonymy of this genus is without doubt due mainly to the fact that no worker has ever had a good series of adult specimens at his disposal.

*Bufo*.—It is evident that Dr. Werner's conception of *angusticeps* is not the same as is entertained by Mr. Boulenger for one of Werner's specimens thus labelled is described as having the first finger longer than the second, whereas according to Boulenger, this is the distinguishing character of *regularis*. The following records require investigation: *regularis* and *granti* both from Smithfield, *angusticeps* from Natal and *vertebralis* from Kentani (Boulenger). All previously published records go to show that *angusticeps* belongs specially to western Cape Province; *vertebralis* is more widely distributed than was supposed for I have had specimens from Victoria West (P. D. Morris), and Bro. J. H. Power records it from Madibi.